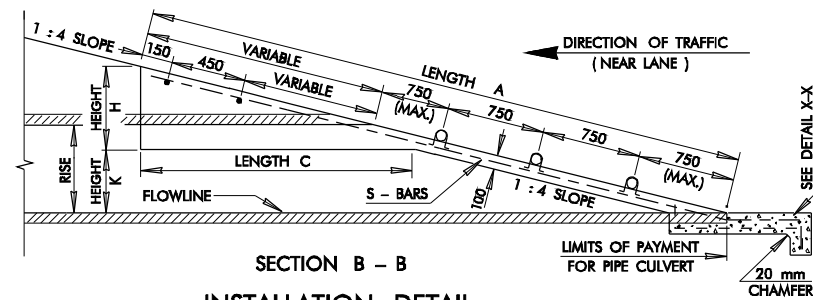
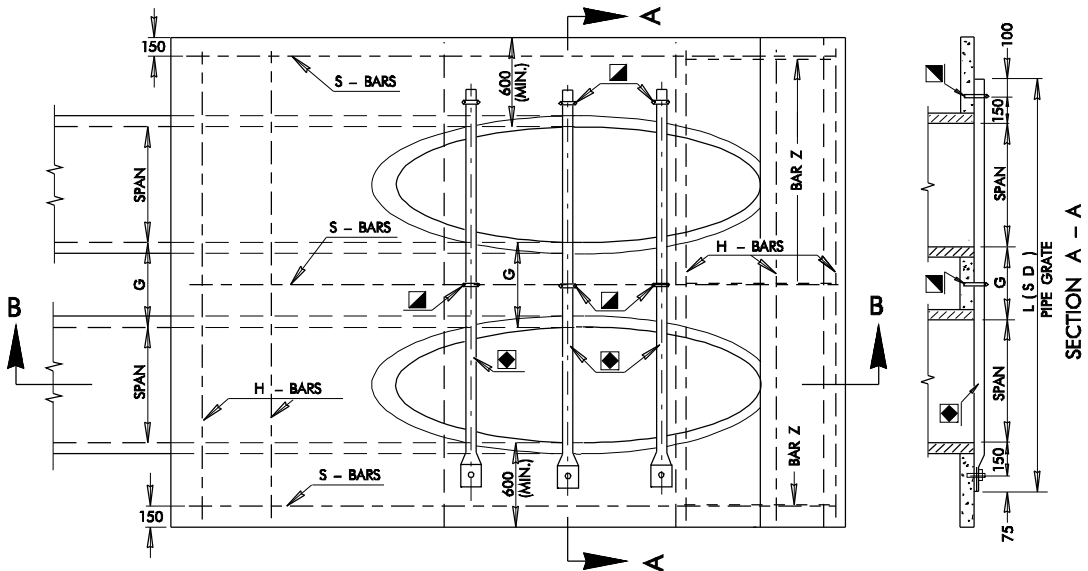


C. E. T. DESIGN	EQUIV. ROUND DIAMETER		REINF. CONC. ROUNC.	REINF. CONC. ARCH PIPE	STEEL ARCH PIPE		ALUMINUM ARCH PIPE		REINF. CONC. ELLIPTICAL PIPE	SIDE DRAIN GRATES	CROSS DRAIN GRATES	G.	
TYPE	mm	in.	mm	mm x mm	mm x mm	mm x mm	mm x mm	mm x mm	mm x mm	L (SD) mm	L (CD) mm	mm	
AA4	450	18	450	2						1700	NONE	300	
	450	18		560 x 345	2					1920	NONE	300	
	450	18			510 x 380	2	510 x 380	2		1820	NONE	300	
	450	18							365 x 575	1	1950	NONE	300
BB4	525	21		660 x 395	2					2120	NONE	300	
	600	24	600	3						2000	NONE	300	
	600	24		725 x 460	2					2205	NONE	300	
	600	24			680 x 500	2	680 x 500	3		2160	NONE	300	
	600	24							490 x 770	2	2340	2 @ 3245	300
	600	24							550 x 865	2	2530	2 @ 3495	300
CC4	675	27									2300	NONE	375
	750	30	750	3							2715	2 @ 3575	460
	750	30		920 x 570	3				610 x 960	2	2795	2 @ 3740	325
	800	32			910 x 660	3	910 x 660	3			2695	2 @ 3945	325
	825	33							670 x 1055	3	2985	2 @ 3990	350
	900	36	900	4							2750	2 @ 4935	450
DD4	900	36		1110 x 675	3						3095	2 @ 4010	375
	900	36			1030 x 740	3	1030 x 740	3			2910	2 @ 4275	350
	900	36							730 x 1150	3	3185	2 @ 4235	385
	1000	39			1150 x 820	4	1150 x 820	4			3185	2 @ 4605	385
	1050	42	1050	5							3125	2 @ 5555	525
	1050	42		1300 x 795	4						3265	2 @ 4500	435
	1050	42							855 x 1345	4	3640	2 @ 4750	450
EE4	1200	48	1200	6							3500	2 @ 6175	600
	1200	48		1485 x 915	5						3970	2 @ 5000	500
	1200	48			1390 x 970	5	1390 x 970	5			3745	2 @ 5225	465
	1200	48							975 x 1535	5	4070	4 @ 5245	500



INSTALLATION DETAIL

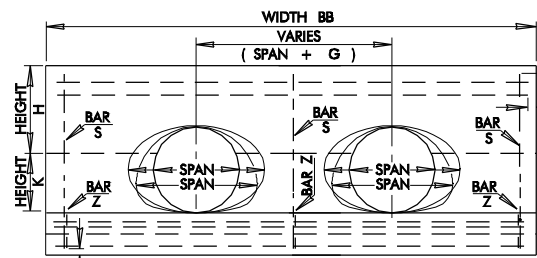
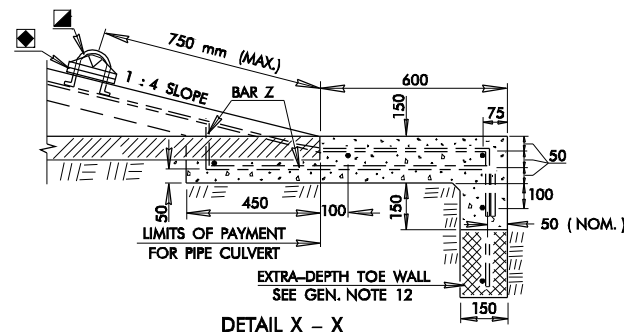
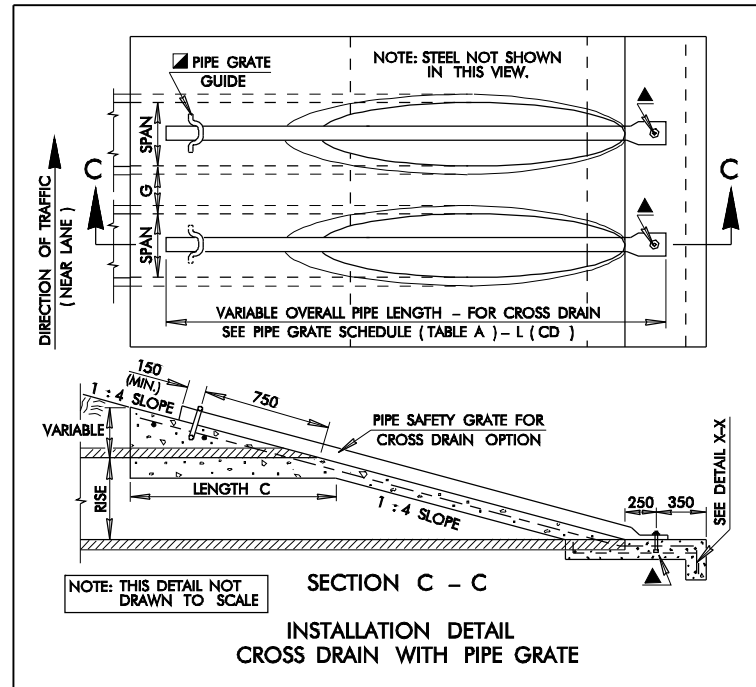
SIDE DRAIN WITH PIPE GRATES

DOUBLE PIPE INSTALLATION – 1 TO 4 SAFETY SLOPE											
TABLE B – SCHEDULE OF DIMENSIONS FOR C. E. T. TYPES (METRIC)											
C.E.T. TYPE	LENGTH A	Ⓐ	Ⓐ	LENGTH C	HEIGHT H	HEIGHT K	Ⓐ	Ⓐ	STEEL LENGTH		
		WIDTH BB	WIDTH BB				CONC.	CONC.	H-BARS	H-BARS	S-BARS
	m	m	m	m	mm	mm	m ³	m ³	m	m	m
AA4	3.10	2.40	2.62	1.70	525	225	1.91	2.15	2.30	2.52	3.76
BB4	3.70	2.70	2.95	1.80	550	350	2.31	2.67	2.60	2.85	4.68
CC4	4.75	3.10	3.45	2.20	650	500	3.48	4.11	3.00	3.35	5.95
DD4	5.65	3.83	4.24	2.40	700	675	4.95	5.86	3.73	4.14	6.56
EE4	6.20	4.20	4.70	2.60	750	750	5.79	7.10	4.10	4.60	7.11

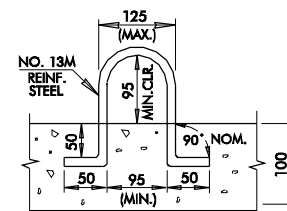
Ⓐ ROUND SHAPE CULVERT OPTIONS

Ⓐ ARCH SHAPE CULVERT OPTIONS

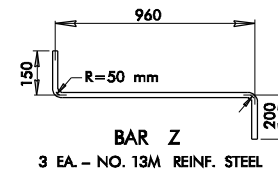
Ⓐ HORIZONTAL ELLIPSE SHAPE CULVERT OPTIONS



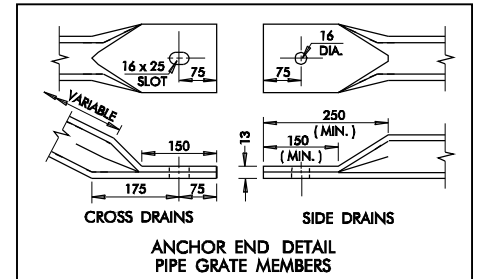
END VIEW
(PIPE GRATES NOT SHOWN THIS VIEW)



**PIPE GRATE GUIDE
(U-BOLT)**



3 EA. - NO. 13M REINF. STEEL



1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 1999 METRIC STANDARD SPECIFICATIONS.
2. QUANTITIES SHOWN IN TABLE A ARE FOR ONE END ONLY. CLASS A CONCRETE SHALL CONFORM TO THE MINIMUM REQUIREMENTS OF SECTION 509 OF THE 1999 METRIC STANDARD SPECIFICATIONS.
3. TYPES AA4 THROUGH EE4 END SECTIONS, AS SHOWN IN TABLE B, MAY BE USED WITH ANY AASHTO DESIGNATED METAL, ALUMINUM & CONCRETE PIPE SIZES, AS SHOWN IN TABLE A. END SECTION QUANTITIES ARE BASED ON METAL PIPE DIMENSIONS, ZERO PIPE WALL THICKNESS AND SMALLEST LISTED ROUND OR ARCH PIPE WITHIN EACH TYPE.
4. SLOPED END OF CULVERT PIPE SHALL BE SHOP CUT. TWO COATS OF COLD GALVANIZATION WILL BE APPLIED TO CUT EDGES OF STEEL CULVERT PIPE. COST OF CUTTING AND GALVANIZING IS INCLUDED IN THE PRICE BID FOR PIPE CULVERT.
5. ALL SIZES OF CULVERT PIPE WILL BE CUT ON 1 TO 4 SLOPE.
6. PIPE FOR SAFETY GRATES SHALL BE 75 mm x 3.43 kg STANDARD WEIGHT STEEL PIPE, SCHEDULE 40. IT SHALL BE FURNISHED GALVANIZED, PLAIN END AND SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM A-53 (HYDROSTATIC TESTS MAY BE WAIVED) OR ASTM F 1083. COST OF GRATES TO BE INCLUDED IN PRICE BID FOR THE C.E.T.
7. ANY GALVANIZED AREA(S) OF METAL PIPE DISTRESSED DURING THE POST FABRICATION AND/OR HANDLING PROCESS SHALL BE COATED WITH AN APPROVED ZINC RICH PAINT.
8. REINFORCING STEEL AND PIPE GRATE GUIDES SHALL BE NO. 13M DEFORMED BARS. COST OF STEEL SHALL BE INCLUDED IN PRICE BID FOR THE CULV. END TREATMENT.
9. CRITERIA FOR USE OF PIPE SAFETY GRATE MEMBERS:
 - (A) ALL SIDE DRAIN AND MULTIPLE PIPE INSTALLATIONS WITHIN THE CLEAR ZONE.
 - (B) ALL CROSS DRAIN INSTALLATIONS WITH A CULVERT SPAN OF 750 mm OR
 - (C) ALL INSTALLATIONS OUTSIDE THE CLEAR ZONE WHERE HAZARD POTENTIAL IS HIGH BASED ON TRAFFIC DIRECTION, SPEED, VOLUME AND SIZE OF CULVERT.NOTE: ANALYZE HYDRAULIC PERFORMANCE AT VARYING DEGREES OF CLOGGING AND APPLY RISK ASSESSMENT BEFORE USING GRATES.
10. PIPE GRATE MEMBERS ARE NOT SHOWN IN END VIEW.
- ▲ 11. ANCHOR END OF PIPE GRATE MEMBERS SHALL BE HELD IN PLACE WITH A NUMBER M14 x 140 mm GALVANIZED BOLT, NUT AND WASHER. THREADS, 45 mm (NOM.) SHALL REMAIN EXPOSED FOR INSTALLING GRATE, WASHER AND NUT. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A-307 WITH COST TO BE INCLUDED IN THE PRICE BID FOR THE CULVERT END TREATMENT.
12. FOR TOTAL QUANTITY OF EXTRA DEPTH TOE WALL, MULTIPLY WIDTH BB TIMES 0.061 FOR EACH METER OF DEPTH OF TOE WALL REQUIRED. PAYMENT TO BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT.
- 13. LONGITUDINAL PIPE SAFETY GRATES FOR CROSS DRAIN INSTALLATIONS ARE NOT NECESSARY OR REQUIRED FOR OPEN TRENCH/DITCH SPANS LESS THAN 750 mm.

PRECAST CULVERT END TREATMENTS OR OTHER ALTERNATIVE DESIGNS MAY BE USED IF APPROPRIATE DRAWINGS ARE SUBMITTED TO AND APPROVED BY THE ENGINEER.

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
613.06(CC)	● CULVERT END TREATMENT	EACH

- SPECIFY TYPE OF END TREATMENT
(EXAMPLE: TYPE BB6 CULVERT END TREATMENT - NG)
- C. E. T. ORIENTATION AND SAFETY GRATE REQUIREMENTS SHALL
BE SPECIFIED ON THE SUMMARY OF DRAINAGE STRUCTURES.
(SEE TYPICAL ABBREVIATIONS)

APPROVED BY ROADWAY ENGINEER

DATE _____

OKLAHOMA DEPT. OF TRANSPORTATION
ROADWAY STANDARD (METRIC)
CULVERT END TREATMENT
DOUBLE PIPE INSTALLATION
1 TO 4 SAFETY SLOPE

1999 SPECIFICATIONS

CET4D-2	00M
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ALL DIMENSIONS ON THIS SHEET IN MILLIMETERS UNLESS OTHERWISE NOTED.

R-80CM